Installation Manual - Quick Reference Guide

Multicluster systems with stand-alone grid or increased self-consumption and battery-backup function

Sunny Island 6.0H / 8.0H and Multicluster Box 12 / NA Box 12 / Grid Connect Box 12

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1 Information on this Document

1.1 Validity

This document is valid for the following device types:

- SI6.0H-11 (Sunny Island 6.0H) from firmware version 3.5
- SI8.0H-11 (Sunny Island 8.0H) from firmware version 3.5
- MC-Box-12.3-20 (Multicluster Box 12)
- NA-Box-12.3-20 (NA Box 12)
- GRID-Box-12.3-20 (Grid Connect Box 12)

1.2 Content and Structure of this Document

This document summarizes the specific information on multicluster systems with Sunny Island inverters and Multicluster Box 12. The structure of the document specifies the chronological sequence for configuration and commissioning. This document does not replace the documentation for the individual products. You will find details and help in the documentation of the respective product.

1.3 Target Group

The activities described in this document must be performed only by qualified persons. Qualified persons must have the following skills:

- Training in how to deal with the dangers and risks associated with installing and using electrical devices and batteries
- Training in the installation and commissioning of electrical devices
- Knowledge of and adherence to the local standards and directives
- Knowledge of and compliance with this document and all safety information

1.4 Additional Information

Links to additional information can be found at www.SMA-Solar.com:

Document title	Document type
MULTICLUSTER BOX 12	Installation – Circuitry Overview
SUNNY ISLAND 3.0M / 4.4M / 6.0H / 8.0H	Installation manual
MULTICLUSTER BOX 12	Operating Manual
NA BOX 12	Operating Manual
GRID CONNECT BOX 12	Operating Manual

1.5 Information Symbols

Symbol	Explanation
⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury
⚠ WARNING	Indicates a hazardous situation which, if not avoided, can result in death or serious injury
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, can result in minor or moderate injury
NOTICE	Indicates a situation which, if not avoided, can result in property damage
⚠ SKILLED PERSON	Indicates that the following section contains tasks that must be performed by qualified persons only
i	Information that is important for a specific topic or goal, but is not safety-relevant
☐	Indicates a requirement for meeting a specific goal
☑	Desired result
✖	A problem that might occur

1.6 Typographies

Typography	Usage	Example
bold	• Display messages • Parameters • Terminals • Slots • Elements to be selected or entered	• To deactivate the intermediate storage of PV energy, select the parameter **261.01 SlfCsmpIncEna** on every master of the multicluster system and set to **Disable**. • Set the device type of the Multicluster Box to **MC-Box-12-2x**.
>	• Connects multiple elements to be selected	• Select **600# Direct Access > Select Number.**
[**Button/Key**]	• Button/key on the inverter to be selected or pressed	• Press [**ENTER**].

1.7 Nomenclature

Complete designation	Designation in this document
Multicluster system with stand-alone grid	Off-grid system
Multicluster system with increased self-consumption and battery-backup function	Battery-Backup System
Multicluster Box 12	Multicluster Box
Grid Connect Box 12	Grid Connect Box
NA Box 12	NA Box
Sunny Island 6.0H / 8.0H	Sunny Island
Sunny Boy, Sunny Mini Central, Sunny Tripower	PV inverters
Gird-forming generators such as PV arrays or utility grids	External energy source

The term parameter includes parameters with configurable values as well as parameters for displaying values.

2 Safety

2.1 Intended Use

The Multicluster Box is the AC main distribution board in a multicluster system. The multicluster system sets up a AC utility grid and comprises multiple three-phase clusters. Three Sunny Island inverters per cluster are connected in parallel on the DC side. The multicluster system can be set up with a stand-alone grid (as an off-grid system) or with an increased self-consumption and battery-backup function (as a battery-backup system).

PV arrays used as external energy sources must be connected to the Multicluster Box only. If required, the AC utility grid of the multicluster system can be synchronized with and connected to the PV array. When the AC utility grid is connected to the PV array, the voltage and frequency in the AC utility grid is regulated by the PV array.

To connect the utility grid to the multicluster system, an NA Box or a Grid Connect Box must be installed between the grid-connection point and Multicluster Box. This allows the AC utility grid of the multicluster system to be synchronized with and connected to the utility grid. To fulfill the technical connection requirements of the grid operator and the local standards and directives, you must select one of the following basic structures:

- Multicluster system with all-pole disconnection

  In the event of grid failure, the multicluster system disconnects all line conductors and the neutral conductor from the utility grid. If the technical connection requirements of the grid operator or the local standards and directives call for or allow all-pole disconnection, you must install this basic structure.

  If the VDE-AR-N 4105 rule applies for the utility grid (e.g. in Germany and Austria), the NA Box must be used. The NA Box always disconnects at all poles (see the operating manual for the NA Box).

  If the VDE-AR-N 4105 rule does not apply for the utility grid, the Grid Connect Box can be used. The Grid Connect Box always comes with an all-pole disconnection function (see the operating manual for the Grid Connect Box).

- Multicluster system without all-pole disconnection

  In the event of grid failure, the multicluster system disconnects all line conductors from the utility grid. The neutral conductor of the battery-backup grid remains permanently connected to the utility grid. If the technical connection requirements of the grid operator or the local standards and directives prohibit disconnection of the neutral conductor, you must install this basic structure.

  When the Grid Connect Box is used, the multicluster system can be operated without all-pole disconnection. The all-pole disconnection function in the Grid Connect Box must be deactivated (see the operating manual for the Grid Connect Box).

The utility grid must, in any case, be a TN or TT grid.

The Multicluster Box, Grid Connect Box and NA Box do **not** replace the distribution board or the PV system. You must additionally install the necessary protective devices for the loads and the PV system.

Loads in multicluster systems are not 100% protected against power failure. The multicluster system is not suitable for supplying life-sustaining medical devices.

Only Sunny Island inverters of the same device type may be installed in a cluster: SI6.0H-11 or SI8.0H-11.

The Sunny Island uses lead-acid batteries or lithium-ion batteries for energy storage. Ensure that the battery room is sufficiently ventilated when lead-acid batteries are used (see the battery manufacturer's documentation). If lithium-ion batteries are connected, the battery management of the lithium-ion battery must be compatible with the Sunny Island (see the technical information "List of Approved Lithium-Ion Batteries" at www.SMA-Solar.com). The lithium-ion battery must be able to supply enough electric current at the Sunny Island inverter's maximum output power (for technical data, see the Sunny Island inverter installation manual).

The AC sources in the multicluster system must be suitable for stand-alone mode with Sunny Island (for PV inverters see Technical Information "PV Inverters in Off-Grid Systems" at www.SMA-Solar.com). The maximum output power of the AC sources in a stand-alone grid must be observed (see the Sunny Island inverter installation manual).

For a multicluster system with increased self-consumption and battery-backup function, the connected PV system must be suitable for both stand-alone mode and utility grid operation (see the planning guidelines "SMA Flexible Storage System with Battery-Backup Function" at www.SMA-Solar.com). The maximum output power of the PV system depends on the installation site(see Section 3.3.3 "Information on Battery-Backup Systems", page 16).

When operating in stand-alone mode, DC loads or DC charge controllers can only be included in multicluster systems with lead-acid batteries. Sunny Island Chargers or charge controllers from third-party suppliers can be used as DC charge controllers. The number of charge controllers is limited to 4 per cluster. If charge controllers from a third-party supplier or DC loads are installed in a multicluster system, an additional battery current sensor must be installed.

DC charge controllers may **not** be included in a multicluster system connected to the utility grid.

With the internal measuring device of the Multicluster Box, the multicluster system detects the electricity fed into and purchased from the grid at the gird connection point of the NA Box or Grid Connect Box. The internal measuring device of the Multicluster Box does not replace the energy meter of the electric utility company.

For PV system monitoring, only the Sunny WebBox is used in multicluster systems.

Use this system only in accordance with the information provided in the enclosed documentation and with the locally applicable standards and directives. Any other application may cause personal injury or property damage.

Alterations to the system (e.g. modifications or conversions) are only permitted with the express written permission of SMA Solar Technology AG. Unauthorized alterations will void guarantee and warranty claims and usually void the operating license. SMA Solar Technology AG shall not be held liable for any damage caused by such alterations.

Any use of the system other than that described in the Intended Use section does not qualify as appropriate.

The enclosed documentation is an integral part of this system. Keep the documentation in a convenient place for future reference and observe all instructions contained therein.

2.2 Safety Information

This section contains safety information that operators must observe at all times when working on or with the system. To prevent personal injury and property damage and to ensure long-term operation of the system, read this section carefully and observe all safety information at all times.

⚠ WARNING

Danger to life from electric shock due to live voltage

High voltages are present in the multicluster system When covers (e.g. an enclosure lid) are removed, this presents a risk of coming into contact with live components. Contact can result in death or serious injury due to electric shock.

- When carrying out any work on the electrical installation, wear suitable personal protective equipment.
- Switch off or disconnect the following components in the following order:
  - Multicluster Box
  - NA Box / Grid Connect Box
  - PV main distribution board
  - PV array
  - Circuit breaker at the grid connection point
  - All Sunny Island inverters
  - Load-break switch of the battery
- Ensure that the multicluster system cannot be reconnected.
- Open the device and ensure that no voltage is present
- Ground and short-circuit the AC conductors outside the device.
- Cover or isolate any adjacent live components.

Danger to life from electric shock due to damaged components

Operating a damaged device can lead to hazardous situations that can result in death or serious injury due to electric shock.

- Only operate the multicluster system when it is technically faultless and in an operationally safe state.
- Ensure that all safety equipment is freely accessible at all times.
- Make sure that all safety equipment is in good working order.

Danger to life from electric shock due to circuit breakers that cannot be tripped

In the battery-backup grid and stand-alone grid, only the circuit breakers that can be tripped by the Sunny Island can be tripped in the event of a grid failure. Circuit breakers with a higher operating current cannot be tripped. Under fault conditions, a voltage that poses a danger to life may be present on accessible parts for several seconds. This can result in death or serious injury.

- Check whether a circuit breaker has a higher trip characteristic than B16 (B16A) or C6 (C6A).
- If a circuit breaker has a higher trip characteristic than the specified circuit breakers that can be tripped, you should also install a residual-current device of type A.

⚠ WARNING

Danger to life due to incompatible lithium-ion battery

An incompatible lithium-ion battery can lead to a fire or an explosion. With incompatible lithium-ion batteries, it is not ensured that the battery management is intrinsically safe and will protect the battery.

- Verify that the battery complies with locally applicable standards and directives and is intrinsically safe.
- Ensure that the lithium-ion batteries are approved for use with the Sunny Island.

  The list of lithium-ion batteries approved for the Sunny Island is updated regularly (see the technical information "List of Approved Lithium-Ion Batteries" at www.SMA-Solar.com).
- If no lithium-ion batteries approved for the Sunny Island can be used, use lead-acid batteries.

Danger to life due to explosive gases

Explosive gases may escape from the battery and cause an explosion. This can result in death or serious injury.

- Protect the battery environment from open flames, embers or sparks.
- Install, operate and maintain the battery in accordance with the manufacturer's specifications.
- Ensure that the battery room is sufficiently ventilated.

Chemical burns and poisoning due to battery electrolyte

If handled inappropriately, battery electrolyte can cause irritation to the eyes, respiratory system and skin and can be toxic. This may result in blindness and serious chemical burns.

- Protect the battery enclosure against destruction.
- Do not open or deform the battery.
- Whenever working on the battery, wear suitable personal protective equipment such as rubber gloves, apron, rubber boots and goggles.
- In the case of acid splashing into eyes or onto skin, rinse thoroughly with clear water and consult a doctor.
- If acid fumes have been inhaled, consult a doctor.
- Install, operate, maintain and dispose of the battery according to the manufacturer's specifications.

Risk of injury due to short-circuit currents

Short-circuit currents in the battery can cause heat build-up and electric arcs. Burns or eye injuries due to flashes may result.

- Remove watches, rings and other metal objects.
- Use insulated tools.
- Do not place tools or metal parts on the battery.

Risk of crushing injuries due to moving PV array parts

Moving parts in the PV array can crush or sever body parts. A PV array can be started automatically by the Sunny Island.

- Only operate the PV array with the safety equipment.
- Install, maintain and operate the PV array according to the manufacturer's specifications.

⚠ CAUTION

Risk of burns due to short-circuit currents on the disconnected Sunny Island

The capacitors in the Sunny Island require 15 minutes to discharge.

- Wait 15 minutes after disconnecting the Sunny Island from the battery.

NOTICE

Damage to the battery due to incorrect settings

The set battery parameters influence the charging behavior of the Sunny Island inverter. The battery can be damaged by incorrect settings for the battery type, nominal voltage and capacity parameters.

- Ensure that the values recommended by the battery manufacturer are set (refer to the technical data of the battery in the manufacturer documentation). Note that the battery charging behavior names used by SMA Solar Technology AG and the battery manufacturer may in some cases differ in meaning (for the battery charging behavior of the Sunny Island inverter, see technical information "Battery Management").
- Set the battery capacity for a ten-hour electric discharge (C10). The battery manufacturer specifies the battery capacity in relation to discharge time.

Destruction of devices due to electrostatic discharge (ESD)

If enclosure parts are removed, the devices (e.g. Sunny Island or PV inverter) can be damaged or destroyed if electronic components or terminals are touched.

- Do not touch any electronic components in open devices.
- Ground yourself before touching any connections.

3 System Description and Information

3.1 Design of a Multicluster Box

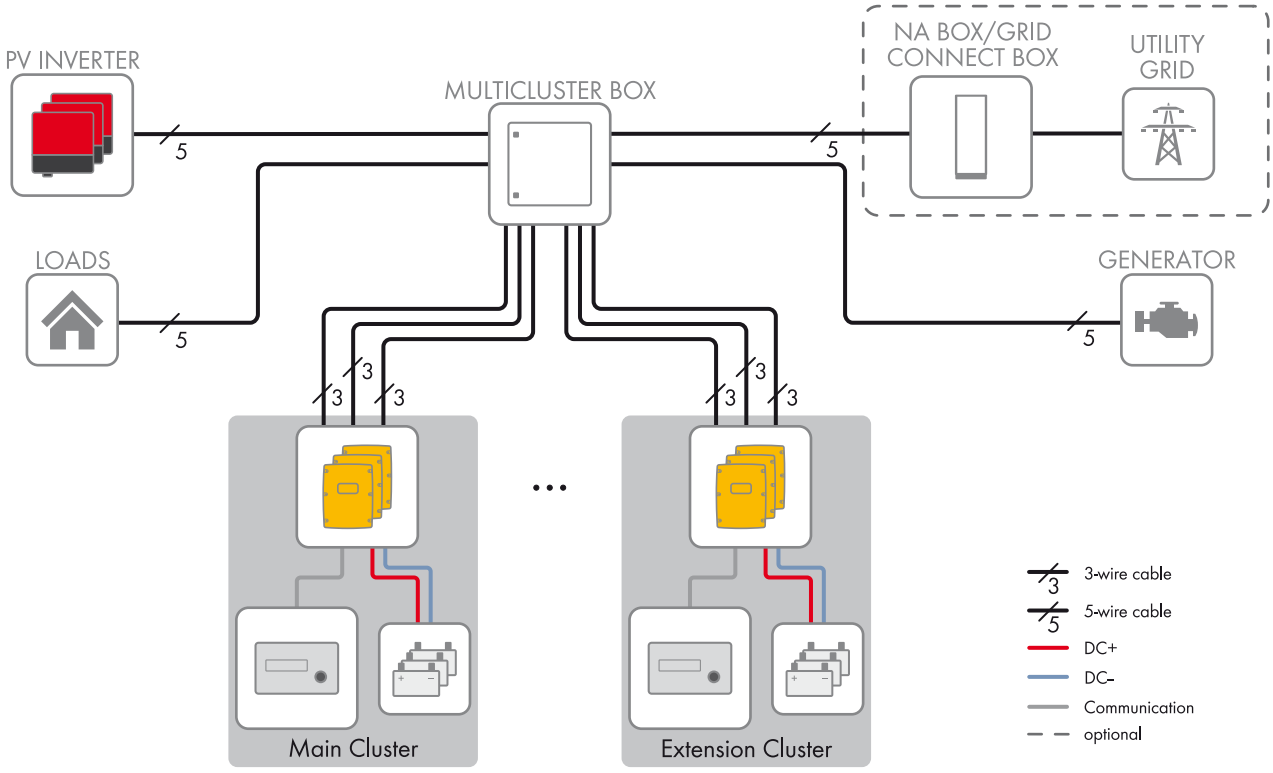


Figure 1: Principle of a multicluster system with Multicluster Box and NA Box or Grid Connect Box

The Multicluster Box is the AC main distribution board in a multicluster system. The multicluster system forms an AC utility grid and comprises multiple three-phase clusters. Three Sunny Island inverters per cluster are connected in parallel on the DC side. The multicluster system can be set up with a stand-alone grid (as an off-grid system) or with an increased self-consumption and battery-backup function (as a battery-backup system).

The main cluster is the leading cluster in the multicluster system. The extension clusters are subordinate to the main cluster.

PV arrays used as an external energy source must be connected only to the Multicluster Box. To connect the utility grid to the multicluster system, an NA Box or a Grid Connect Box must be installed.

3.2 Off-Grid System

3.2.1 Operating Principle of an Off-Grid System

Multicluster systems set up as off-grid systems can form self-sufficient utility grids fed with energy from multiple AC sources in the stand-alone grid (e.g. PV inverter), from a grid-forming PV array and/or with DC charge controllers (e.g. Sunny Island Charger). As a voltage source, the Sunny Island inverter forms the stand-alone grid. The Sunny Island inverter regulates the balance between the energy that is fed in and the energy that is used and features a battery, PV array and load management system.

Battery management

Battery management of the Sunny Island inverter is based on the precise determination of the state of charge. By combining the three most common methods for recording the state of charge, the Sunny Island can achieve a measuring accuracy of more than 95%. This way, battery overcharge and deep discharge are avoided.

Another feature of battery management is the extremely gentle charging control. It automatically selects the optimum charging strategy for the battery type and the situation in which it is used. This means that overcharging can be reliably prevented and the battery can be fully charged on a regular basis. The available charge energy is used optimally at all times (see technical information "Battery Management" at www.SMA-Solar.com).

Generator management

If necessary, the Sunny Island can synchronize with a PV array and connect directly. When the stand-alone grid is connected to the PV array, the voltage and frequency in the stand-alone grid are regulated by the PV array.

The Sunny Island inverter generator management system allows for uninterruptible connection of the stand-alone grid to the generator and uninterruptible isolation from the PV array. The generator management system controls the PV array via a start and stop signal. A PV array current control ensures that the PV array always operates within the parameters set on the Sunny Island. The generator management system allows the use of PV arrays that have a low output power in proportion to its nominal load (see technical document "Sunny Island - Generator Whitepaper" at www.SMA-Solar.com)

Load control

Load control enables control of the AC sources in stand-alone grids, control of a PV array and the targeted disconnection of loads.

The AC sources in the off-grid system are limited in their power output by the stand-alone grid frequency. In case of excess energy, the load control system increases the power frequency. This limits the output power of the PV inverters, for example.

If not enough energy is available for all loads or the battery is to be preserved, the load control system can request energy from a PV array via the generator management system. The generator management system starts the PV array, and the off-grid system is supplied with sufficient energy.

If no PV array is present in the off-grid system or the energy is not sufficient despite the presence of a PV array, the load control system turns the loads off through load shedding. One-level load shedding is integrated in the Multicluster Box. The load-shedding contactor is controlled directly by the master of the main cluster via communication with the Multicluster Box. If you install an additional load-shedding contactor in a multicluster system, it is controlled with a multifunction relay in the master of extension cluster 1.

3.2.2 Information on Multicluster Systems with Stand-Alone Grid

Information on batteries

Lithium-ion batteries in off-grid systems

To meet the requirements of off-grid systems, the Sunny Island has a high overload capacity. This overload capacity is subject to the battery being able to supply sufficient current. With lithium-ion batteries, this ampacity cannot be taken for granted.

- Check with the battery manufacturer whether the battery is suitable for off-grid systems with Sunny Island inverters. Pay special attention to the ampacity.

Recommendations for battery capacity

SMA Solar Technology AG recommends the following minimum battery capacities.

- Minimum battery capacity per Sunny Island:
  - SI6.0H-11: 190 Ah
  - SI8.0H-11: 250 Ah
- Minimum battery capacity per 1000 Wp power of the PV system: 100 Ah

The sum of the individual battery capacities is the total minimum battery capacity and applies to a ten-hour electric discharge (C10). The minimum battery capacity must be observed to ensure stable operation of the system.

Information on utility grid connection

The utility grid can support or assume the function of a PV array in, for example, areas with a weak grid structure. To connect an off-grid system to the utility grid, a Grid Connect Box must be used.

Information on Sunny Island

Device Types within Clusters

In all multicluster systems, the Sunny Island inverters must be device type SI6.0H-11 or SI8.0H-11. Only Sunny Island inverters of the same device type may be installed in a cluster: SI6.0H-11 or SI8.0H-11.

Information on the PV system

Maximum PV system power

In off-grid systems, the maximum PV system power depends on the total power of the Sunny Island inverters.

- Maximum output power of the PV system per SI6.0H-11: 9,200 W
- Maximum output power of the PV system per SI8.0H-11: 12,000 W

The maximum output power of the PV system must be observed to ensure stable operation of the off-grid system.

3.2.3 Optional Components and Functions

Component	Description
External load-shedding contactor	Contactor controlled by the Sunny Island for isolation of loads in the multicluster system during two-level load shedding.
Sunny WebBox	Remote monitoring and system configuration of the multicluster system with stand-alone grid.
Sunny Island Charger 50	Charge controller for off-grid systems with lead-acid batteries A maximum of four Sunny Island Charger charge controllers can be connected to a cluster. If lithium-ion batteries are used, no charge controllers can be connected. DC charge controllers may not be used if the utility grid is connected.
Battery current sensor	Shunt for measuring the battery current A battery current sensor is required in off-grid systems with DC loads or with charge controllers from third-party suppliers.

The Sunny Island inverter offers the following functions for multicluster systems with stand-alone grid via two multifunction relays (see the Sunny Island inverter installation manual):

Function	Description
Controlling PV arrays	A multifunction relay activates if a PV array request is received from the Sunny Island inverter's generator management system. With the multifunction relay, you can control PV arrays with an electrical remote-start function or connect a signal generator for PV arrays with no autostart function.
Controlling load-shedding contactors	A multifunction relay is activated depending on the state of charge of the battery. Depending on the configuration, you can install one-level load shedding with one multifunction relay or two-level load shedding with two multifunction relays. You can also adjust the thresholds for the state of charge of the battery depending on the time of day.
Time control for external processes	External processes can be time-controlled with a multifunction relay.

Function	Description
Display of operating states and warning messages	You can connect message devices to the multifunction relays to allow operating states and warning messages from the Sunny Island inverter to be output. One of the following operating states and warning messages can be displayed for each multifunction relay: • The PV array is running and is connected. • A Sunny Island displays an error message of level 2 or higher. Only the error messages within a cluster are evaluated here. • The Sunny Island displays a warning. Only the warnings within a cluster are evaluated here.
Control of a battery-room fan	The multifunction relay is activated when the charging current causes the battery to emit gasses. A connected battery room fan is switched on for at least one hour.
Control of an electrolyte pump	Depending on the nominal energy throughput, the multifunction relay is activated at least once a day.
Use of excess energy	During the constant voltage phase, a multifunction relay is activated and thus controls additional loads that can put to good use any excess energy from AC sources in the stand-alone grid (e.g. of a PV system).

3.3 Battery-Backup System

3.3.1 Battery-Backup System

Multicluster systems with increased self-consumption and battery-backup function (battery-backup systems) are connected to the utility grid via an NA Box or a Grid Connect Box. .

When the battery-backup system is connected to the utility grid, Sunny Island inverters can use the batteries for intermediate storage of PV energy. The stored PV energy can then be used by your appliances during the evening and nighttime hours. With this, electricity purchased from the grid can be reduced and self-consumption or internal power supply optimized.

The NA Box or Grid Connect Box disconnects the battery-backup system from the utility grid during grid failure. The multicluster system continues to supply power to the loads via the battery-backup grid without interruption. The PV system can synchronize with the battery-backup system and feed in. When the utility grid is available again, the battery-backup system synchronizes with the utility grid. Following successful synchronization, the NA Box or Grid Connect Box connects the battery-backup system to the utility grid.

3.3.2 Requirements of VDE Application Guide 2510-2

The requirements below apply only for systems for which the following properties are all applicable:

- The system is a self-consumption system and/or battery-backup system.
- The system is installed in Germany.

In accordance with the scope of VDE application guide 2510-2, a manufacturer's system is regarded as a complete energy storage system only if products are used that have been approved by the manufacturer (see the technical information "List of Approved Lithium-Ion Batteries" at www.SMA-Solar.com). If products are used that have not been approved by SMA Solar Technology AG, the installer is deemed to be the manufacturer of the system.

The requirements of VDE application guide 2510-2 are fulfilled if the installation is carried out in the accordance with the technical documentation of the Sunny Island inverter.

3.3.3 Information on Battery-Backup Systems

Information on batteries

Lithium-ion batteries in battery-backup systems

To meet the requirements of battery-backup systems, the Sunny Island has a high overload capacity. This overload capacity is subject to the battery being able to supply sufficient current. With lithium-ion batteries, this ampacity cannot be taken for granted.

- Check with the battery manufacturer whether the battery is suitable for battery-backup grids with Sunny Island inverters. In particular, note the ampacity if, in the event of grid failure, the battery-backup grid is supplied by the Sunny Island.

Recommendations for battery capacity

SMA Solar Technology AG recommends a minimum battery capacity of 100 Ah per 1,000 Wp of PV system power. This battery capacity is rated for a ten-hour electric discharge (C10).

The minimum battery capacity must be observed to ensure stable operation of the system.

Information on utility grid connection

Utility grid connection via NA Box

If the VDE-AR-N 4105 rule applies for the utility grid (e.g. in Germany and Austria), the NA Box must be used. In the event of grid failure, the NA Box always disconnects the multicluster system from the utility grid at all poles.

When the NA Box is used in accordance with the VDE-AR-N 4105 (e.g. in Germany), it must be ensured that the multicluster system never feeds more than 100 kW into the utility grid.

Utility grid connection via Grid Connect Box

The Grid Connect Box may be used only in areas where application guide VDE-AR-N 4105 does **not** apply.

The technical connection requirements of the grid operator and the local standards and directives specify if the multicluster system, in the event of grid failure, disconnects from the utility grid at all poles or only the line conductors. The Grid Connect Box always comes with an all-pole disconnection function.

- If all-pole disconnection is not allowed, the all-pole disconnection function in the Grid Connect Box must be deactivated (see the operating manual for the Grid Connect Box).

Information on the Sunny Island

Device types within a cluster

In all multicluster systems, the Sunny Island inverters must be device type SI6.0H-11 or SI8.0H-11. Only Sunny Island inverters of the same device type may be installed in a cluster: SI6.0H-11 or SI8.0H-11.

Deactivation of the intermediate storage of PV energy during certain charging procedures

To increase the service life of the battery, the Sunny Island inverter regularly carries out full charges and equalization charges (see technical information "Battery Management" at www.SMA-Solar.com). During this charging process, the intermediate storage of PV energy is deactivated and electricity may have to be purchased to perform the full and equalization charges.

Information on the PV system

Maximum PV system power

In battery-backup systems, the maximum power of the PV system depends on the automatic transfer switch and the local standards and directives.

- Maximum output power of the PV system when the NA Box is used in accordance with application guide VDE-AR-N 4105 (e.g. in Germany): 100 kW
- Maximum output power of the PV system when the NA Box is used and application guide VDE-AR-N 4105 is not required: 138 kW
- Maximum output power of the PV system when the Grid Connect Box is used: 138 kW

Frequency-dependent control of active power feed-in

In battery-backup systems, the active power of the PV inverters must be controllable depending on the frequency.

- With existing systems, ensure that the PV inverters are controllable depending on the frequency (see planning guidelines "SMA Flexible Storage System with Battery-Backup Function").

Information on the communication devices

Electricity supply of communication devices

During a grid failure, only the devices in the battery-backup grid are supplied with current.

- Connect the electricity supply of communication devices to the battery-backup grid.

4 Circuitry of Multicluster Systems

4.1 Connecting the Sunny Island Inverters

4.1.1 Connecting the Master in the Main Cluster

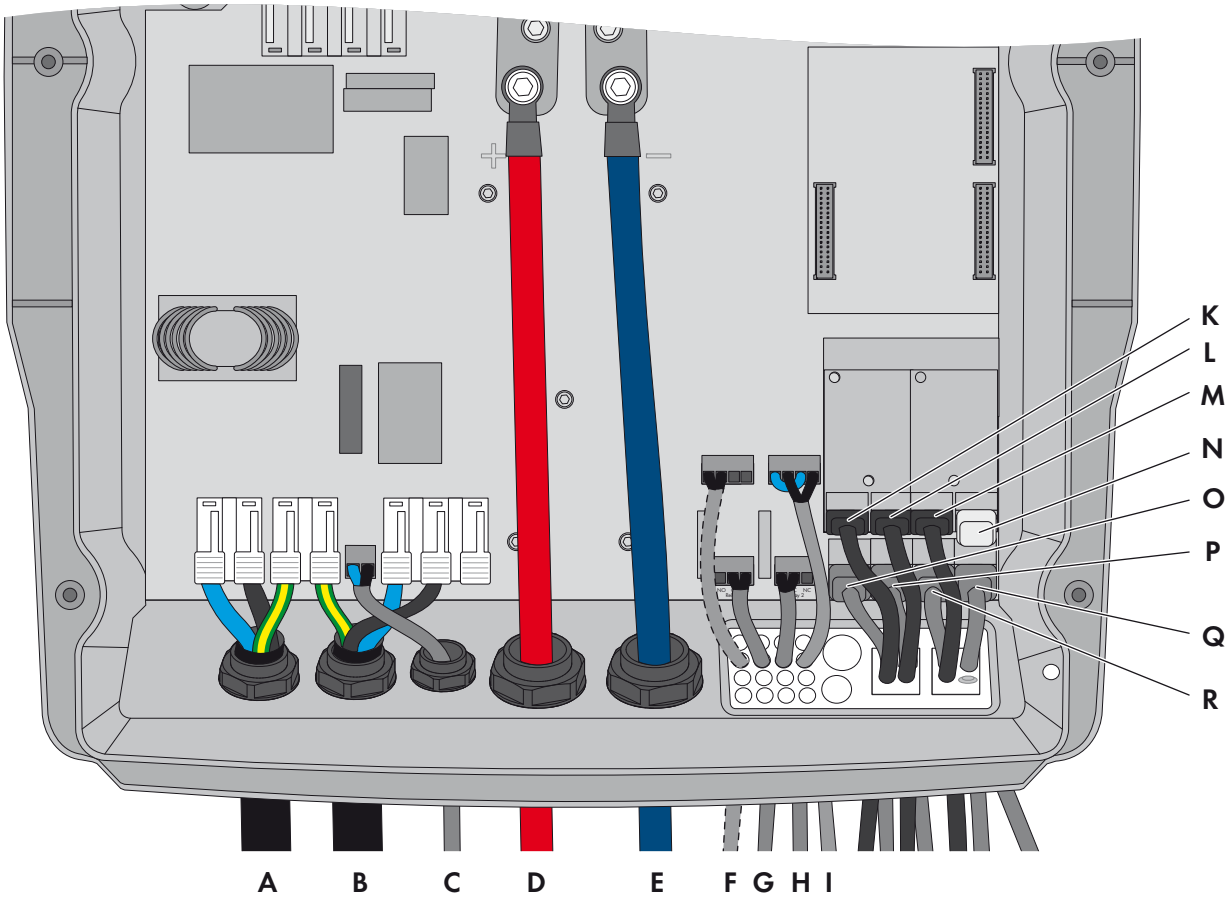


Figure 2: Connecting the master in the main cluster

Position	Designation	Description / information
A	Cable for the control voltage	Sunny Island: connection to **AC1 Loads/Sunny Boys** terminals **L**, **N** and **PE** Multicluster Box: connection to **X106** terminals **1**, **2** and **4** Conductor cross-section: 1.5 mm² to 2.5 mm²
B	AC power cable	Sunny Island: connection to **AC2 Gen/Grid** terminals **L**, **N** and **PE** Multicluster Box: connection to **X105** terminals **1**, **4** and **7** Conductor cross-section: 10 mm² to 16 mm²
C	Measuring cable for voltage measurement	Sunny Island: connection **ExtVtg** terminals **L** and **N** Multicluster Box: connection to **X112** terminals **3** and **4** Conductor cross-section: 1.5 mm² to 2.5 mm²

Position	Designation	Description / information
D	DC+ cable	Battery terminal Conductor cross-section: 50 mm² to 95 mm² Cable diameter: 14 mm to 25 mm Torque: 12 Nm
E	DC − cable	
F	Measuring cable of the battery temperature sensor	Sunny Island: connection **BatTmp** A battery temperature sensor must be connected only if lead-acid batteries are used. Mount the battery temperature sensor in the middle of the battery terminal, in the upper third of the battery cell.
G	Control cable to the Multicluster Box	The control cable must be connected if an NA Box or a Grid Connect Box is installed. Sunny Island: connection to **Relay1** terminals **C** and **NC** Multicluster Box: connection to **X112** terminals **1** and **2** Conductor cross-section: 1.5 mm² to 2.5 mm²
H	Control cable to the Multicluster Box	Sunny Island: connection to **Relay2** terminals **C** and **NO** Multicluster Box: connection to **X113** terminals **1** and **2** Conductor cross-section: 1.5 mm² to 2.5 mm²
I	Control cable to the Multicluster Box	Sunny Island: connections **DigIn+** und **BatVtgOut+** Multicluster Box: connections to **X113** terminals **3** and **4** In the Sunny Island inverter, the terminals **DigIn** − and **BatVtgOut** − must be connected Conductor cross-section: 1.5 mm² to 2.5 mm²
K	RS485 communication bus	Sunny Island: at SI-COMSMA.BGx terminal **ComSmaIn** Connection to other nodes (e.g. Sunny WebBox) A terminator must terminate the RS485 communication bus on the last bus node.
L	RS485 communication bus	Sunny Island: at SI-COMSMA.BGx terminal **ComSmaOut** Connection to other nodes (e.g. Sunny WebBox) Sunny WebBox: terminal **SMACOM**
M	Data cable for the communication with the masters of the extension cluster	At SI-SYSCAN.BGx terminal **SysCanIn** Master of the extension cluster: at SI-SYSCAN.BGx terminal **SysCanOut** The communication bus must be equipped with a terminator on both ends.
N	Terminator	At SI-SYSCAN.BGx terminal **SysCanOut** The communication bus must be equipped with a terminator on both ends.
O	Measuring cable	Sunny Island: terminal **BackupVtgCur** Multicluster Box: terminal **Mstr./L1**
P	Data cable to Sunny Remote Control display	Sunny Island: **Display** terminal

Position	Designation	Description / information
Q	Data cable for communication within the cluster	Sunny Island: terminal **ComSync Out** The communication bus connects the master with the slaves in each cluster and additionally with the Multicluster Box in the main cluster. The communication bus must be equipped with a terminator on both ends.
R	Data cable for communication within the cluster	Sunny Island: terminal **ComSync In** Multicluster Box: terminal **ComSync Out** The communication bus must be equipped with a terminator on both ends.
–	Openings in the cable support sleeves	Unused openings in the cable support sleeves of the Sunny Island inverter must be sealed (see the Sunny Island inverter installation manual).

4.1.2 Connecting Slave 1 in the Main Cluster

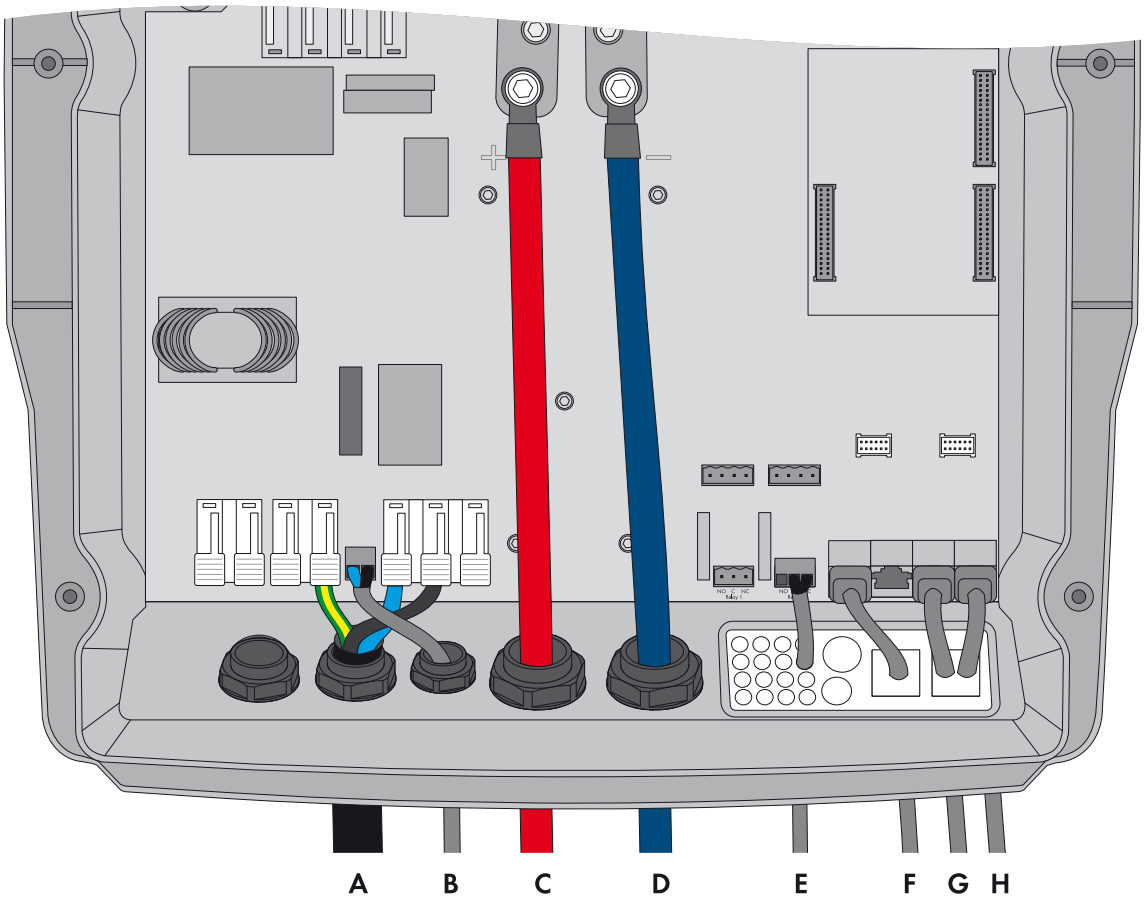


Figure 3: Connecting slave 1 in the main cluster

Position	Designation	Description / information
A	AC power cable	Sunny Island: connection to **AC2 Gen/Grid** terminals **L**, **N** and **PE** Multicluster Box: connection to **X105** terminals **2**, **5** and **8** Conductor cross-section: 10 mm² to 16 mm²
B	Measuring cable for voltage measurement	Sunny Island: connection **ExtVtg** terminals **L** and **N** Multicluster Box: connections to **X112** terminals **7** and **8** Conductor cross-section: 1.5 mm² to 2.5 mm²

Position	Designation	Description / information
C	DC+ cable	Battery terminal Conductor cross-section: 50 mm² to 95 mm² Cable diameter: 14 mm to 25 mm Torque: 12 Nm
D	DC − cable	
E	Control cable to the Multicluster Box	The control cable must be connected if an NA Box is installed. Sunny Island: connection to **Relay2** terminals **C** and **NC** Multicluster Box: connections to **X112** terminals **5** and **6** Conductor cross-section: 1.5 mm² to 2.5 mm²
F	Measuring cable	Sunny Island: terminal **BackupVtgCur** Multicluster Box: terminal **Slv.1/L2**
G	Data cable for communication within the cluster	Terminal **ComSync In** Master: terminal **ComSync Out**
H	Data cable for communication within the cluster	Terminal **ComSync Out** Slave 2: terminal **ComSync In**

4.1.3 Connecting Slave 2 in the Main Cluster

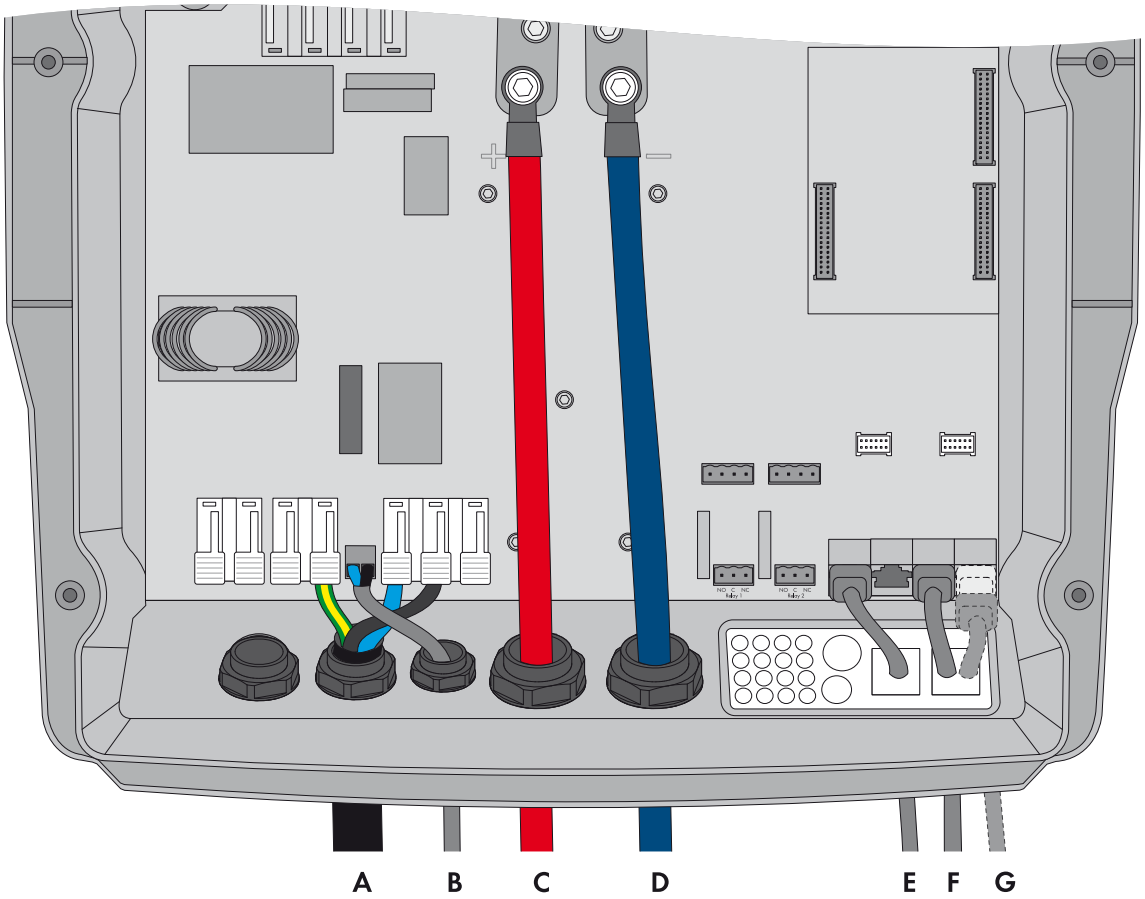


Figure 4: Connecting slave 2 in the main cluster

Position	Designation	Description / information
A	AC power cable	Sunny Island: connection to **AC2 Gen/Grid** terminals **L**, **N** and **PE** Multicluster Box: connection to **X105** terminals **3**, **6** and **9** Conductor cross-section: 10 mm² to 16 mm²
B	Measuring cable for voltage measurement	Sunny Island: connection **ExtVtg** terminals **L** and **N** Multicluster Box: connection to **X112** terminals **9** and **10** Conductor cross-section: 1.5 mm² to 2.5 mm²
C	DC+ cable	Battery terminal Conductor cross-section: 50 mm² to 95 mm² Cable diameter: 14 mm to 25 mm Torque: 12 Nm
D	DC − cable	
E	Measuring cable	Sunny Island: terminal **BackupVtgCur** Multicluster Box: terminal **Slv.2/L3**
F	Data cable for communication within the cluster	Terminal **ComSync In** Slave 1: terminal **ComSync In**
G	Data cable for communication within the cluster	Terminal **ComSync Out** A data cable must be connected to the battery only when lithium-ion batteries are used. The communication bus must be equipped with a terminator on both ends.

4.1.4 Connecting the Sunny Island Inverters in Extension Clusters

Function of the Sunny Island inverter	Which cables must be connected?	Where are the cables connected?
Master in extension cluster 1/2/3	See installation - Circuitry Overview of the Multicluster Box	see Section 4.1.1, page 18
Slave 1 in extension cluster 1/2/3		see Section 4.1.2, page 20
Slave 2 in extension cluster 1/2/3		see Section 4.1.3, page 22

4.2 Connecting the Sunny WebBox

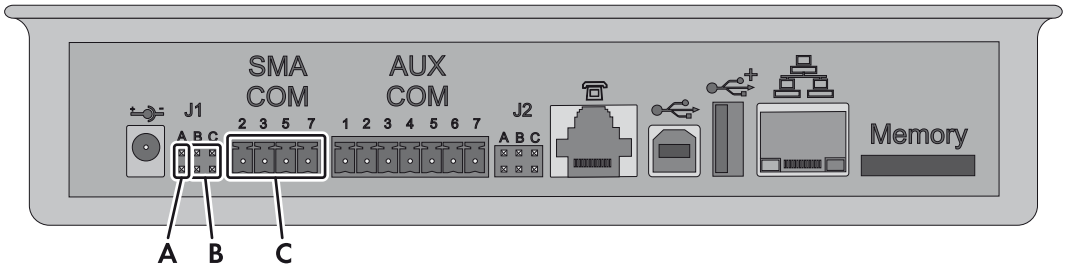


Figure 5: Connection of the RS485 communication bus to the Sunny WebBox

Position	Designation	Description / information
A	Jumper **J1A**	Terminator If the Sunny WebBox is installed at the end of the communication bus, a jumper must be inserted. If the Sunny WebBox is installed between two nodes, the jumper must be removed.
B	Jumper **J1B** and **J1C**	Signal bias voltage Make sure that both jumpers are inserted.
C	**SMACOM**	Terminal RS485 **2**: Signal Data+ (A), color-coding of the insulated conductor: green with white stripes **5**: Signal GND, color-coding of the insulated conductor: orange with white stripes **7**: Signal Data– (B), color-coding of the insulated conductor: white with green stripes

5 Commissioning

5.1 Basic Configuration of Sunny Island inverters

5.1.1 Basic Configuration Requirements

- ☐ A Multicluster Box of the device type MC-Box-12.3-20 must be installed.
- ☐ The multicluster system must be installed correctly (see Multicluster Box and NA Box / Grid Connect Box documentation).
- ☐ In the Multicluster Box, all circuit breakers of the Sunny Island inverter must be open. This ensures that the Sunny Island inverters are not connected to an AC source.
- ☐ The Sunny Remote Control must be connected to the master of each cluster. This determines which Sunny Island is the master during the basic configuration.

5.1.2 Performing Basic Configuration of the Off-Grid System

To commission the multicluster system as an off-grid system and without the definition of a country data set, always perform basic configuration as an off-grid system.

NOTICE

Damage to the battery due to incorrect settings

The set battery parameters influence the charging behavior of the Sunny Island inverter. The battery can be damaged by incorrect settings for the battery type, nominal voltage and capacity parameters.

- Ensure that the values recommended by the battery manufacturer are set (refer to the technical data of the battery in the manufacturer documentation). Note that the battery charging behavior names used by SMA Solar Technology AG and the battery manufacturer may, in some cases, differ in meaning (for the battery charging behavior of the Sunny Island inverter, see technical information "Battery Management").
- Set the battery capacity for a ten-hour electric discharge (C10). The battery manufacturer specifies the battery capacity in relation to discharge time.

Procedure:

Check the wiring
(see the Sunny Island inverter installation manual).

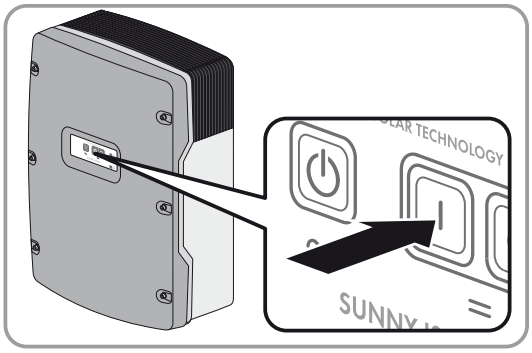
↓

Close all devices except the BatFuse.
This protects all live components from being touched.

↓

Close the BatFuse and press and hold the "On" button on each master until you hear a signal.

↓



When the Sunny Remote Control shows **<Init System>**, press and hold the button on the Sunny Remote Control.

☑ A signal sounds three times and the Sunny Remote Control displays the Quick Configuration Guide.

Turn the button on the Sunny Remote Control and select **New System**.

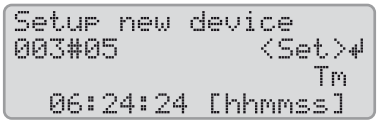
Press the button. This confirms your selection of **New System**.

☑ An entry confirmation prompt appears.

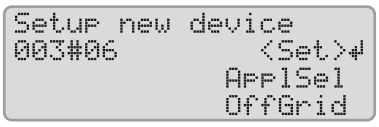
Set **Y** and press the button.

Set the date.

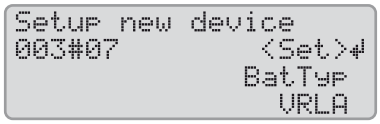
Set the time.



Set **OffGrid**.

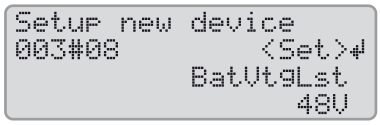


Set the battery type:

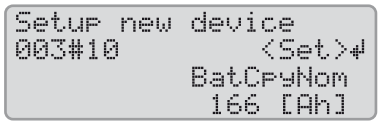


VRLA: Lead-acid battery with electrolyte absorbed in glass mat or immobilized in gel
FLA: Lead-acid battery with liquid electrolyte

Set the nominal voltage of the battery.

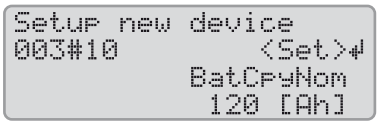


Set the battery capacity for ten-hour electric discharge (for determining the battery capacity, see the Sunny Island inverter installation manual).



LiIon_Ext-BMS: lithium-ion battery

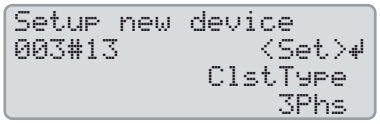
Set the battery capacity for ten-hour electric discharge (for determining the battery capacity, see the Sunny Island inverter installation manual).



Set the grid voltage and power frequency of the stand-alone grid:

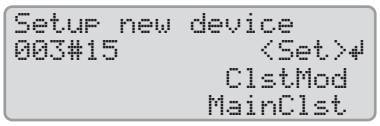
230V_50Hz: grid voltage 230 V, power frequency 50 Hz
220V_60Hz: grid voltage 220 V, power frequency 60 Hz

Set **3Phase**:



Set **MultiClst**:

Set the type of cluster:



MainClst: The cluster is a main cluster

Set the device type of the Multicluster Box to **MC-Box-12-2x**.

Set the type of external energy source.

PvOnly: PV array and utility grid are **not** connected.

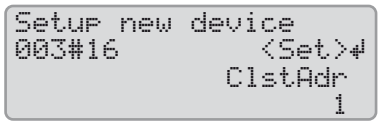
Gen: The PV array is connected.

Grid: The utility grid is connected.

GenGrid: The PV array and utility grid are connected.

ExtnClst: The cluster is an extension cluster

Set the address of the extension cluster (e.g. set extension cluster 1 to **1**).



When **Gen** or **GenGrid** is selected, set the maximum PV array current per line conductor for continuous operation.

```
Setup new device
003#22        <Set>↵
          GnCurNom
         160.0 [A]
```

When **Gen** or **GenGrid** is selected, set the maximum line current per line conductor for continuous operation.

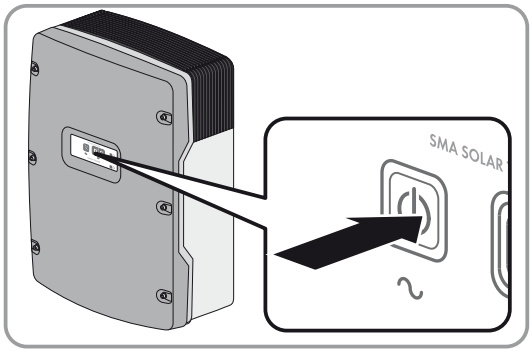
```
Setup new device
003#23        <Set>↵
          GdCurNom
         160.0 [A]
```

Confirm the basic configuration with **Y**.

```
Setup new system
Done ?  <accept Y/N>
```

Wait until the upper LED (inverter LED) on slave 1 is flashing and the Sunny Remote Control is displaying **To identify Slave1, press Tss on the Slv**.

Press the start-stop button on slave 1.



Wait until the inverter LED on slave 2 is flashing and the Sunny Remote Control is displaying **To identify Slave2, press Tss on the Slv**.

Press the start-stop button on slave 2.

☑ The basic configuration is complete.
If an SD memory card is inserted in the Sunny Remote Control, the message **Do not remove MMC/SD card ...** is displayed and the SD memory card is integrated in the file system.

Configure all other clusters.
To do so, perform the steps of the Quick Configuration Guide for each master separately.

5.1.3 Performing Basic Configuration of a Battery-Backup System

To commission the multicluster system as a battery-backup system and with the definition of a country data set, always perform the basic configuration as an off-grid system.

NOTICE

Damage to the battery due to incorrect settings

The set battery parameters influence the charging behavior of the Sunny Island inverter. The battery can be damaged by incorrect settings for the battery type, nominal voltage and capacity parameters.

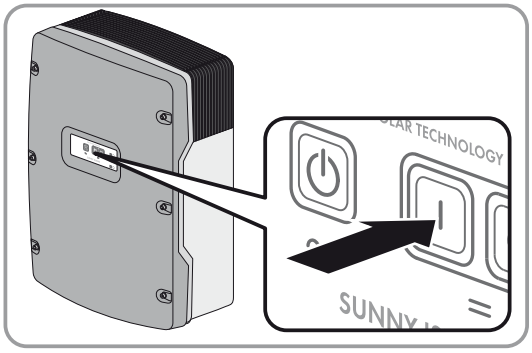
- Ensure that the values recommended by the battery manufacturer are set (refer to the technical data of the battery in the manufacturer documentation). Note that the battery charging behavior names used by SMA Solar Technology AG and the battery manufacturer may, in some cases, differ in meaning (for the battery charging behavior of the Sunny Island inverter, see technical information "Battery Management").
- Set the battery capacity for a ten-hour electric discharge (C10). The battery manufacturer specifies the battery capacity in relation to discharge time.

Procedure:

Check the wiring
(see the Sunny Island inverter installation manual).

Close all devices except the BatFuse.
This protects all live components from being touched.

Close the BatFuse and press and hold the "On" button on each master until you hear a signal.



When the Sunny Remote Control shows **<Init System>**, press and hold the button on the Sunny Remote Control.

☑ A signal sounds three times and the Sunny Remote Control displays the Quick Configuration Guide.

Turn the button on the Sunny Remote Control and select **New System**.

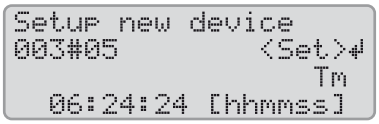
Press the button. This confirms your selection of **New System**.

☑ An entry confirmation prompt appears.

Set **Y** and press the button.

Set the date.

Set the time.



Set **OnGrid**.

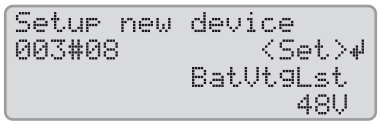
Set the battery type:

VRLA: Lead-acid battery with electrolyte absorbed in glass mat or immobilized in gel
FLA: Lead-acid battery with liquid electrolyte

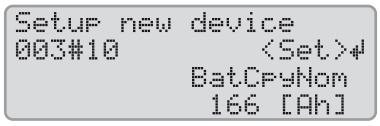
Set the nominal voltage of the battery.

LiIon_Ext-BMS: lithium-ion battery

Set the battery capacity for ten-hour electric discharge (for determining the battery capacity, see the Sunny Island inverter installation manual).



Set the battery capacity for ten-hour electric discharge (for determining the battery capacity, see the Sunny Island inverter installation manual).

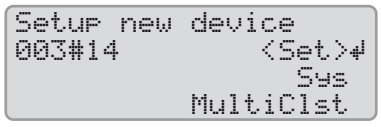


During the first ten operating hours, set the country data set:

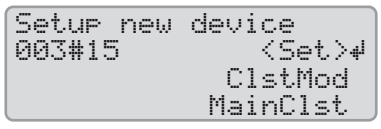
AR-N4105: configuration in accordance with application rule VDE-AR-N 4105 (see Section 5.3.2 "Adjusting the Configuration of the Sunny Island Inverter", page 35)

Set **3Phase**:

Set **MultiClst**:



Set the type of cluster:

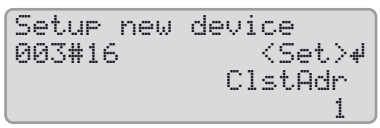


MainClst: The cluster is a main cluster

Set the device type of the Multicluster Box to **MC-Box-12-2x**.

ExtnClst: The cluster is an extension cluster

Set the address of the extension cluster (e.g. set extension cluster 1 to **1**).



Set the maximum PV array current per line conductor for continuous operation.

```
Setup new device
003#22          <Set>↵
             GnCurNom
            160.0 [A]
```

If no PV array is connected, select the next parameter.

or

If the country data set is set to **AR-N4105**, select the next parameter.

Set the maximum line current per line conductor for continuous operation.

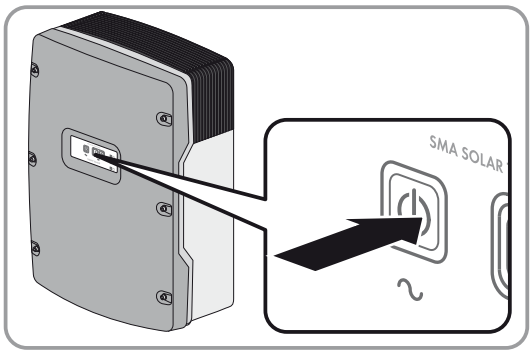
```
Setup new device
003#23          <Set>↵
             GdCurNom
            160.0 [A]
```

Confirm the basic configuration with **Y**.

```
Setup new system
Done ?  <accept Y/N>
```

Wait until the upper LED (inverter LED) on slave 1 is flashing and the Sunny Remote Control is displaying **To identify Slave1, press Tss on the Slv**.

Press the start-stop button on slave 1.



Wait until the inverter LED on slave 2 is flashing and the Sunny Remote Control is displaying **To identify Slave2, press Tss on the Slv**.

Press the start-stop button on slave 2.

☑ The basic configuration is complete.
If an SD memory card is inserted in the Sunny Remote Control, the message **Do not remove MMC/SD card ...** is displayed and the SD memory card is integrated in the file system.

Configure all other clusters.
To do so, perform the steps of the Quick Configuration Guide for each master separately.

5.2 Commissioning an Off-Grid System

5.2.1 Commissioning Procedure for an Off-Grid System

Procedure		Explanation	See
1.	Check the residual-current devices in the Multicluster Box.	Prior to commissioning, ensure that the residual-current devices are tripping properly.	Operating manual for the Multicluster Box
2.	Commissioning the multifunction relays	–	Section 5.2.2, page 33
3.	Start the off-grid system.	–	Section 5.2.3, page 34
4.	Test the battery current sensor.	–	Quick reference guide "Off-Grid Systems" of Sunny Island.
5.	Test the PV array.	–	Quick reference guide "Off-Grid Systems" of Sunny Island.
6.	Test the load shedding.	–	Section 5.2.4, page 34
7.	Commission the PV system.	–	PV inverter documentation
8.	If the PV inverters are not configured for stand-alone mode ex works, configure the country standard or country data set of the PV inverters for stand-alone mode (see the PV inverter documentation).	–	
9.	Complete commissioning.	–	Quick reference guide "Off-Grid Systems" of Sunny Island.

5.2.2 Commissioning the Multifunction Relays

In multicluster systems with MC-BOX-12.3-20, multifunction relays 1 and 2 in the master of the main cluster and multifunction relay 2 in slave 1 of the main cluster are set permanently. Therefore, optional components and functions can only be controlled via Sunny Island inverters in the extension clusters.

- Set the functions of the multifunction relays in the Sunny Island inverters of the extension clusters (see the Sunny Island inverter installation manual). For this, use the Sunny Remote Control.

5.2.3 Starting the Off-Grid System

Requirement:

☐ All Sunny Island inverters must be switched on.

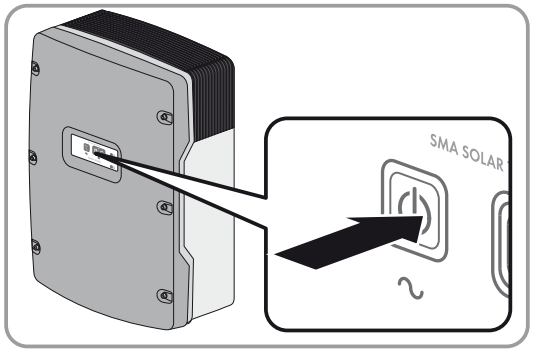
☐ The circuit breakers for the AC sources in the stand-alone grid must be switched off in the AC distribution board.

☐ The load-break switch of the PV array must be open.

☐ The circuit breakers for the charge controllers must be switched off in the DC distribution board.

Procedure:

- Press the start-stop button on the master of the main cluster and hold it until a signal sounds.



or

Press and hold the button on the Sunny Remote Control until a signal sounds.

☑ The system starts and the inverter LED on each Sunny Island inverter lights up green.

5.2.4 Testing the Load Shedding

Requirements:

☐ The additional load-shedding contactor is connected to a multifunction relay in the master of the extension cluster.

☐ The Sunny Island must be in operation (see chapter 7.3 "Starting the System", page 41).

Procedure:

1. Select the parameter of the multifunction relay for the load-shedding contactor (e.g. **241.02 Rly2Op** for the **Relay2** multifunction relay of the master).
2. Note the parameter value.
3. Set the parameter to **Off**.

☑ The load-shedding contactor sheds the loads.

✖ Does the load-shedding contactor not shed the loads?

The multifunction relay for triggering the load-shedding contactor was incorrectly configured.

- Check the configuration and eliminate the fault.

The wiring of the load-shedding contactor is faulty.

- Ensure that the multifunction relay is correctly wired.

4. Set the parameter to the setting that has been noted down.

5.3 Commissioning a Battery-Backup System

5.3.1 Commissioning Procedure for a Battery-Backup System

Procedure		Explanation	See
1.	Check the residual-current devices in the Multicluster Box.	Prior to commissioning, ensure that the residual-current devices and tie switches are tripping properly.	Operating manual for the Multicluster Box
2.	If a Grid Connect Box has been installed, check residual-current devices in the Grid Connect Box.		Operating manual for the Grid Connect Box
	If an NA Box has been installed, check the tie switches in the NA Box.		Operating manual for the NA Box
3.	Adjust the configuration of the Sunny Island inverter.	–	Section 5.3.2, page 35
4.	Adjust the configuration of the PV inverters.	–	Section 5.3.3, page 35
5.	Attach the labels.	–	Section 5.3.4, page 36
6.	Commission the battery-backup system.	–	Section 5.3.5, page 36
7.	To use PV system monitoring, register your multicluster system in Sunny Portal.	–	Section 5.4, page 37

5.3.2 Adjusting the Configuration of the Sunny Island Inverter

In the multicluster system with battery-backup grid, the Sunny Island inverters are connected to the utility grid and must meet the requirements of the grid operators. The Sunny Island inverters fulfill the requirements of application guide VDE-AR-N 4105:2011-08. The standard country data set of the Sunny Island inverters is set to VDE-AR-4105 by default. The configuration may be adjusted only on request or with the permission of the grid operator (see the Sunny Island operating manual).

Use in other countries is possible with the agreement of the grid operator. Consult the grid operator on whether adjustment is necessary.

5.3.3 Adjusting the Configuration of the PV Inverters

In battery-backup systems, the active power of the PV inverters should be controllable depending on the frequency (see the planning guidelines "SMA Flexible Storage System with Battery-Backup Function"). If your grid operator prohibits control of active power feed-in in the case of overfrequency, you can also use the PV inverters without changing the configuration. SMA Solar Technology AG recommends activating the frequency-dependent control of the PV inverters.

Frequency-dependent control of active power in accordance with application guide AR-N 4105

The country data set **VDE-AR-4105** complies with application guide AR-N 4105 and is equipped with a frequency-dependent control of active power.

- If the country data set **VDE-AR-4105** is selected, no further adjustments are necessary.

Requirements:

☐ The firmware version of the PV inverters must support the frequency-dependent control of active power (see the planning guidelines "SMA Flexible Storage System with Battery-Backup Function" at www.SMA-Solar.com).

☐ You must be authorized to change Grid Guard parameters. You can find the application form at www.SMA-Solar.com in the download area of the relevant PV inverter.

Procedure:

1. At the planned installation site, check whether parameters of the PV inverter must be adjusted for frequency-dependent active power limitation (see the quick reference guide "SMA Flexible Storage System with Battery-Backup Function" of the Sunny Island inverter).

2. Coordinate the parameter adjustment with the grid operator.
3. If the grid operator approved the activation of the frequency-dependent active-power limitation, set the parameters to the following values (see the documentation of the communication product).

Parameters	Value**
P-WCtlHzMod Operating mode of active power limitation in the case of overfrequency P(f)*	**On** or **WCtlHz**
P-WGra Active power gradient, linear instantaneous power gradient configuration*	40
P-HzStr Difference between starting frequency and power frequency, linear instantaneous power gradient configuration*	0.2
P-HzStop Difference between reset frequency and power frequency, linear instantaneous power gradient configuration*	0.2
P-HzStopWGra Active power gradient after reset frequency, linear instantaneous power gradient configuration*	10

* Menu **Equipment & device control system**

** The adjustments are based on the requirements for PV inverters from application rule "VDE-AR-N 4105:2011-08."

5.3.4 Attaching the Labels

The warning label for battery-backup systems is included in the scope of delivery of the Sunny Island inverter.

- Attach the warning label "Battery-Backup System" to the AC main distributor from the outside.

5.3.5 Commissioning the Battery-Backup System

Intermediate storage of PV energy

The intermediate storage of PV energy is activated automatically.

With regard to the battery-backup system, the parameter **ApplSel** must be set to **OnGrid** during basic configuration (see Section 5.1.3 "Performing Basic Configuration of a Battery-Backup System", page 29). The intermediate storage of PV energy is thereby activated automatically.

Deactivation of the intermediate storage of PV energy during certain charging procedures

To increase the service life of the battery, every multicluster system regularly carries out full charges and equalization charges (see technical information "Battery Management" at www.SMA-Solar.com). With regard to the battery-backup system, the intermediate storage of PV energy is deactivated during this charging process and electricity may have to be purchased to perform the full and equalization charges.

Requirements:

☐ The preparations for the commissioning at the Multicluster Box must be completed.

☐ The preparations for commissioning at the NA Box / Grid Connect Box must be completed (see the operating manual for the Multicluster Box and operating manual for the NA Box or Grid Connect Box).

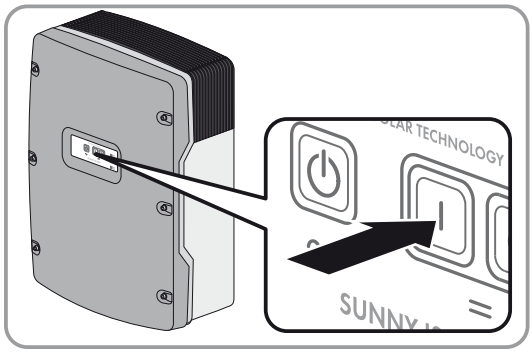
☐ The function of the residual-current devices and the tie switches must be checked (see the operating manual for the Multicluster Box and operating manual for the NA Box or Grid Connect Box).

☐ The basic configuration of the Sunny Island inverters must be completed (see Section 5.1.3, page 29).

Procedure:

1. Commission the PV system.

2. To deactivate the intermediate storage of PV energy, select the parameter **261.01 SlfCsmpIncEna** on every master of the multicluster system and set to **Disable**.
3. Press the start-stop button on the master of the main cluster and hold it until a signal sounds.



or

Press and hold the button on the Sunny Remote Control until a signal sounds.

5.4 Registering the Multicluster System in Sunny Portal

To use PV system monitoring, register your multicluster system in Sunny Portal.

Procedure:

- Register Sunny WebBox in Sunny Portal (see the Sunny WebBox user manual).

6 Contact

If you experience any technical problems with our products, please contact the SMA Service Line. We need the following information in order to provide you with the necessary assistance:

- Displayed error message
- Type, serial number and firmware version of the Sunny Island inverter
- Type, rated capacity and nominal voltage of the connected battery
- Type and serial number of Multicluster Box
- If an NA Box or a Grid Connect Box is installed, type and serial number of the NA Box or Grid Connect Box.
- Type, serial number, firmware version or software version of the connected communication products
- Type, serial number and firmware version of the PV inverters
- If a PV array is connected: type, power and maximum current for the PV array

Australia	SMA Australia Pty Ltd. Sydney Toll free for Australia: 1800 SMA AUS (1800 762 287) International: +61 2 9491 4200	Belgien Belgique België Luxemburg Luxembourg Nederland	SMA Benelux BVBA/SPRL Mechelen +32 15 286 730
Argentina Brasil Chile Perú	SMA South America SPA Santiago +562 2820 2101	Česko Magyarország Polska România Slovensko	SMA Central & Eastern Europe s.r.o. Praha +420 235 010 417
Danmark Deutschland Österreich Schweiz	SMA Solar Technology AG Niestetal SMA Online Service Center: www.SMA.de/Service Sunny Boy, Sunny Mini Central, Sunny Tripower: +49 561 9522-1499 Monitoring Systems (Kommunikationsprodukte): +49 561 9522-2499 Fuel Save Controller (PV-Diesel Hybrid-systeme): +49 561 9522-3199 Sunny Island, Sunny Backup, Hydro Boy: +49 561 9522-399 Sunny Central: +49 561 9522-299	France	SMA France S.A.S. Lyon Sunny Boy, Sunny Mini Central, Sunny Tripower : +33 472 09 04 40 Monitoring Systems : +33 472 09 04 41 Sunny Island : +33 472 09 04 42 Sunny Central : +33 472 09 04 43
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